

Policy Messages on Upscaling of smart grid solutions

1. About upscaling

Upscaling is a challenging phase in the innovation process. Many successful smaller trials of innovative technology solutions never make it across the “valley of death” to demonstrate viability at larger scale and in different contexts, and hence do not reach the stage of wider market deployment.

There are several definitions of upscaling in the literature. Upscaling may e.g. include rollout, expansion, replication and diffusion of outcome from research, pilots and demonstrations¹. Here we use the term upscaling as the general term, acknowledging that such processes can indeed be analyzed and described with other terminology and with more precision. Importantly, upscaling of smart grid/energy system innovation concerns not only technological development, but involve also overcoming complex barriers concerning e.g. social, legal and economic aspects. Hence, supporting upscaling through public policy measures may involve a wide variety of measures depending on context.

2. The role of public institutions in supporting upscaling

Government actors, especially ministries and corresponding funding agencies, investing public money in smart grid research and innovation, have a key role to play in promoting upscaling and supporting innovators through this challenging phase. Through the design and management of research and innovation programs at international, national or regional level, public sector institutions have an important stake in steering the development of smart grid solutions and their application in society.

¹ A useful description and analysis of upscaling applied to smart grid use cases (with focus on flexibility) from four European countries can be found in the Guidebook developed by the EU-project Re-Flex: <http://reflex-smartgrid.eu/images/ReFlex---Guidebook.pdf>.

3. Messages for Public Funding Decision Makers

Suggestions on how to overcome key barriers to upscaling of smart grid solutions in society:

Barrier 1. Low customer engagement

- For many smart grid solutions, e.g. flexible demand and renewable energy integration, active customer engagement is key. In many cases, it is challenging to gain sufficient interest among customers to realize the full potential of the innovation.

Recommendations:

- Funding agencies may identify different stakeholder groups and develop appropriate stakeholder engagement plans, considering the interests of each of these.
- Funding agencies may devote a part of their budget to customer engagement activities². However, it is important to carry out a proper cost-benefit analysis of such actions and seek opinions from relevant stakeholders before making funding decisions.
- Funding agencies may define clear consumer engagement objectives, highlighting suitable Key Performance Indicators (KPIs), to be able to manage and evaluate the effectiveness of customer engagement activities.
- Public funding agencies may have a dialogue with regulatory bodies about adjusting the income regulation framework of network operators, including tariff structures (e.g. Time-of-Use pricing), to promote upscaling of smart grid solutions, including more active customers.
- Public funding agencies may have a dialogue with regulatory bodies about the access to customer data for different stakeholders, including network operators, aggregators and the customers themselves, to enable smart grid solutions. Privacy and cybersecurity concerns must be addressed.

Barrier 2. Innovation process halts after project completion

- It is a common problem that the results of successful research and innovation projects are not scaled up, e.g. when public project funding ceases or when the projects' smart grid solutions are too narrowly tailored to the needs of one or a limited number of stakeholders.

Recommendations:

- Funding agencies may provide extended pre-allocated post-project funding focused on incentivizing dissemination and exploitation of innovation results.

² Funding agencies may require evidence of customer engagement activities in the project reporting.

- To achieve a smooth transition and continued innovation after projects end, funding agencies may incentivize scaling activities by simplifying procedures for accessing additional funds or other support to promote knowledge transfer.
- Funding agencies may want to guarantee that within project consortia, actors are involved that have the capacity for upscaling or which have a keen interest in providing knowledge transfer services (e.g. planning offices or consultants).
- Funding agencies may demand a higher degree of interaction and exchange of experience and results between funded projects to incentivize continued innovation and the forming of new consortia for upscaling projects.

Barrier 3. Challenge to make public funding contribute through the whole innovation process

- Public funding is normally focused on research and initial pilot and demonstration projects. In many cases however, there is a shortage of market-driven financing solutions ensuring that the innovation resulting from successful publicly funded projects are not discontinued when approaching the commercialization stage, e.g. due to uncertainties about risk and return on investment.

Recommendations:

- Funding agencies can support the smooth transition from public to market financing to avoid disrupting innovation, e.g. by leveraging new sources and financing models, such as crowdfunding, in the later innovation stages.
- Funding agencies may assist in communicating energy transition needs and business opportunities with market investors, including managing expectations about cost and return.
- Funding agencies may prioritize allocation of public support to projects with potentially high impact for the energy transition.
- Funding agencies may consider reallocating some funding to innovation closer to application and market deployment, provided it is permitted in legislation.
- Funding agencies may offer advice to innovators on how to access financial instruments beyond public funding, e.g. crowdfunding or how to reach out to angel investors.
- It is important for public funding agencies to be aware that investing in upscaling a particular technology or solution is likely to have the effect of downscaling other technologies or options. The selection of solutions for upscaling initiatives must therefore be transparent and consider system effects, including cost-benefit and social aspects.
- Funding agencies may also include knowledge transfer processes in the cost-benefit analyses when selecting projects to receive support.

Barrier 4. Lack of clear, shared vision and objectives by different stakeholders on sector development

- To realize the introduction of smart grids in the energy system, a very large number of stakeholders are involved (government, utilities, solution providers, customers, etc.).

These stakeholders often have different interests and views in regard to important technology or policy pathways.

Recommendations:

- Funding agencies have an important role in clarifying basic needs for sector development and aligning different stakeholder interests.
- Funding agencies may support the greater involvement by the public, e.g. leveraging crowd funding, local cooperative financing solutions, or in other ways channeling public pressure to speed up the energy transition.
- Funding agencies have a mediating role, facilitating the identification of commonly accepted solutions for project stakeholders.
- Funding agencies may support project stakeholders in using objective tools and models, e.g. for cost-benefit analysis and evaluation.

Barrier 5. Lack of sense of urgency among sector stakeholders focusing on business-as-usual

- The energy transition will benefit from proactive stakeholders understanding the urgency in applying smart grid solutions. This is currently hampered by a high degree of uncertainty regarding future technology pathways and a low understanding of opportunities in the long-term transition of the energy sector.

Recommendations:

- Funding agencies may communicate success cases in which high-impact solutions have been successfully deployed to inspire and raise awareness of all relevant stakeholders involved in the energy transition.
- Funding agencies may arrange match-making events for cross-stakeholder interaction and knowledge transfer – particularly including grid operators – aiming at creating projects with high potential for successful implementation.
- Funding agencies may evaluate and communicate benefits of research and innovation, thus nudging stakeholders to become more open to engage in smart grid innovation.

Barrier 6. Rigid regulatory system hampering smart grid deployment

- Applying new technologies and solutions in the energy system may require adaptation of regulatory frameworks. Such changes take a long time to realize and have thus a hampering effect on the scaling potential of smart grid innovation.

Recommendations:

- Given their knowledge of smart grid innovation and their regulatory challenges, funding agencies have an important role to assist regulatory bodies in analyzing more effective regulation that enable upscaling of technologies and solutions. This may include a continuous dialogue about:
 - New ideas for regulatory adaptations to support new smart grid solutions.

- Development of regulatory sandbox³ options.
- Definition of critical regulations for the development of smart grid solutions.
- Supporting network tariff structures which favor e.g. flexibility solutions.
- Funding bodies may promote the involvement of prosumers and other active customers to trigger change by providing information to regulatory bodies about their needs and preferences with regard to smart grid solutions.
- Funding bodies may benefit greatly from sharing knowledge about successful use-cases and lessons learned in different countries (e.g. through the ISGAN network).

4. Background

These policy messages have been developed within the framework of the ISGAN Knowledge Transfer Project (KTP) “Public Support to Smart Grid RD&I”, an initiative started in 2017 gathering a diverse set of stakeholders from public funding agencies, ministries, research institutes and academia. The long-term objective of this initiative is to yield better impact from publicly supported smart grid research, demonstration and innovation projects by facilitating concrete and practical peer-to-peer guidance between public stakeholders on lessons learned and innovative approaches in this regard.

In 2019, the project focused on upscaling of smart grid/energy system solutions and involved representatives from 9 countries (Austria, Belgium, Germany, India, Korea, Netherlands, Russia, Spain and Sweden), who have developed the above policy messages in collaboration.

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³ See Casebook and Policy Messages developed in the ISGAN Regulatory Sandbox project (2019) here: <http://www.iea-isgan.org/knowledge-exchange-on-experimental-regulatory-sandboxes-to-enable-smart-grid-deployment/>.